

Overview of the NOVAR family:

an advanced automatic power factor controllers and components

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The main product line of KMB systems is an automatic power factor correction controller (APFCR) and its related accessories for various simple to advanced applications. As there is a lot of different power factor correction scenarios with lot of different challenges, we'd like to present the following brief overview of all our products and solutions.

No matter whether you are a panel builder, designer, system engineer or manager, we hope that this tutorial will provide you with useful information and some direction towards an additional resources. In the following article you will be introduced with simple volume solutions as well as more advanced precise controllers and the top, special purpose APFCRs.



Our portfolio includes basic compact instruments for volume applications, more advanced classical power factor controllers with mechanical / relay outputs and special thyristor controllers for fast (real-time, dynamic) power factor compensation cabinets with thyristor switching modules. We offer common single phase PFC as well as more advanced three phase PFC (for unbalanced conditions, optionally with embedded meter, power analyser and also a data logger). Our controllers are used worldwide in low voltage cabinets and compensation panels as well as in the most demanding MV and HV substation automation applications.

Ask us for references...

We have strong confidence in our controllers and we would like you, *our customers*, to share this confidence with us as well. In case of any doubts, questions and special requirements please contact our technical support at support@kmb.cz or sales department at sales@kmb.cz.

Common NOVAR features and functions

All our controllers share many features of the most advanced line. Our philosophy is to provide simple out of the box installation, continually monitor and protect the complete compensation system, take all possible actions to improve reliability and lifetime of the cabinet and optionally to provide all important monitoring data for simple integration within remote control and automation systems - SCADA, OPC etc.

Technical specifications

Measurement Principles - precise & correct,

- precise current and power factor measurement
- precise measurement and control functions under harsh conditions
- evaluation of total harmonic distortion (THD) level
- evaluation of current harmonic load of capacitors
- temperature measurement and control with built-in sensor
- supports both loads and distributed generation, also at the same time

Control Principles - always improving the overall system lifetime

- speed of response separately programmable for under- and over-compensation
- speed of response increases in proportion to instantaneous control deviation
- adjustable range reduces total number of interventions
- mains decompensation option
- two-rate operation controlled by energy flow direction or optional input
- any output can be set as automatic, fixed or alarm.
- outputs can control cooling / heating appliance

Effective operation - fast and simple out-of-box installation

- supports all combinations of measuring voltages and currents
- automatic detection of connection, nominal voltage
- automatic control section recognition
- during installation the governor automatically recognizes power of each section
- supports all types and sizes of the control sections
- continuous monitoring of section value recognized in the control process
- continuous checking of control sections in the control process
- failed sections are decommissioned automatically and reported via alarm
- automatic reconnection of disabled sections when repaired
- programmable relay independently configurable for warning or actuation functions

Comparison table of power factor controllers												
NOVAR Model	Outputs R=relay T=transistor	Sensitivity [mA]	2 nd tariff Input	Supply Volt. Up To 500V	Relay common pole Separated	Temp. Meas. & fan Control	Fast Compensation	Optional Remote Comm.	Panel 144x144	Panel 96x96	DIN-rail	3-phase Controller
1005	5+1 R	20	×	×	×	✓	×	×	×	✓	×	×
1007	7+1 R	20	×	×	×	✓	×	×	×	✓	×	×
1005D	5+1 R	20	×	×	×	✓	×	×	×	×	✓	×
1007D	7+1 R	20	×	×	×	✓	×	×	×	×	✓	×
1106	6 R	2	×	×	×	✓	×	✓	✓	×	×	×
1114	14 R	2	×	×	×	✓	×	✓	✓	×	×	×
1206	6 R	2	✓	×	×	✓	×	✓	✓	×	×	×
1214	14 R	2	✓	×	×	✓	×	✓	✓	×	×	×
1106/S400	6 R	2	×	✓	✓	✓	×	✓	✓	×	×	×
1114/S400	14 R	2	×	✓	✓	✓	×	✓	✓	×	×	×
1206/S400	6 R	2	✓	✓	✓	✓	×	✓	✓	×	×	×
1214/S400	14 R	2	✓	✓	✓	✓	×	✓	✓	×	×	×
1312	12 T+2 R	2	✓	×	×	✓	✓	✓	✓	×	×	×
1312-3	12 T+2 R	2	✓	×	×	✓	✓	✓	✓	×	×	✓
1414	14 R	2	✓	×	×	✓	×	✓	✓	×	×	✓
2418	18	5	✓	✓	✓	✓	×	✓	✓	×	×	✓
2618	18	5	✓	✓	✓	✓	×	✓	✓	×	×	✓

Basic Automatic Model of Power Factor Correction

in this category - the functional simplicity, compact size and a good price is always our concern. This category offers basic controllers with good current precision of 20 mA at $I_{NOM} = 5\text{ A}$ and 6 or 8 relay outputs. We have two models for compact panel enclosure and for DIN rail mounting.

NOVAR 1005 and 1007 - Panel mounted 96x96

These controllers are designed for small compensation cabinets and for less demanding applications with budgetary constraints. Both are fully automatic and do not need any configuration in a typical setup. Single phase measurement, control and automatic step selection is performed wisely to increase the overall lifetime of the PFC system. The NOVAR 1007 has up to 8 output relays. In both models the temperature control function can be used for one relay to provide cooling or heating of the cabinet.

NOVAR 1005D and 1007D - DIN rail mountable PFC

Shares the same core and all functions and parameters with the previous controller type. The only difference is an enclosure, intended for installation onto the DIN rail.

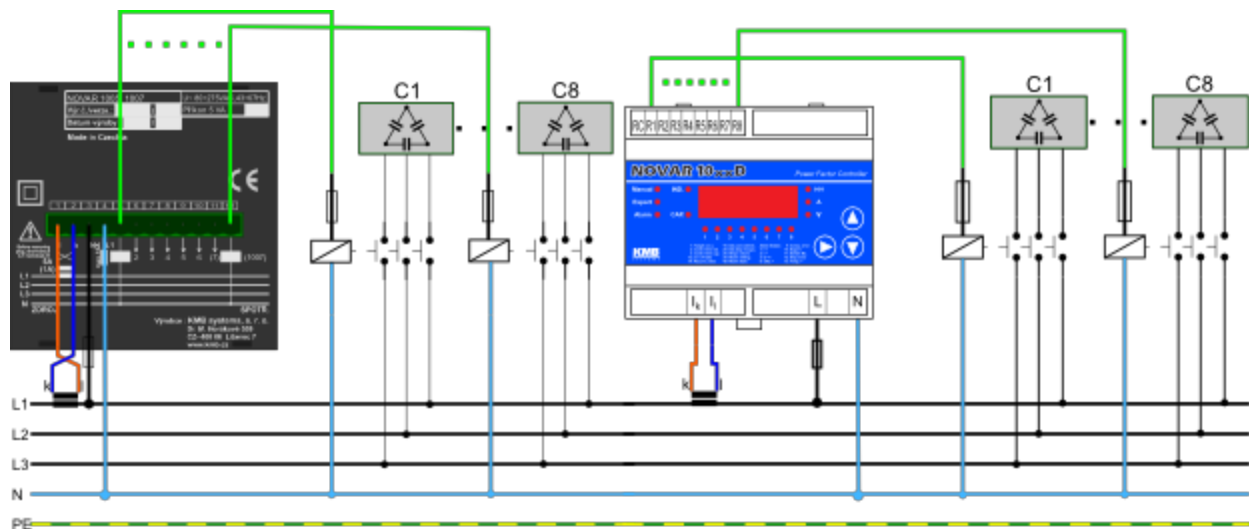


Fig. 1: Sample connection of the NOVAR 1007 (left) and NOVAR 1007D (right)
- direct measurement and direct control of up to 8 steps.

Robust precise solution for all common, single phase apps

in this category - the precise, universal and remotely accessible controller is presented. It offers excellent current precision of only 2 mA at $I_{\text{NOM}} = 5 \text{ A}$ and 6 or 14 relay outputs. Arbitrary communication options of serial RS-232 and RS-485 or 10/100 Mbit Ethernet is a surplus for integration with remote monitoring application.

NOVAR 1106 and 1114 - Complete high precision PFC

NOVAR 1206 and 1214 - Special PFC for VT application (separate power supply)

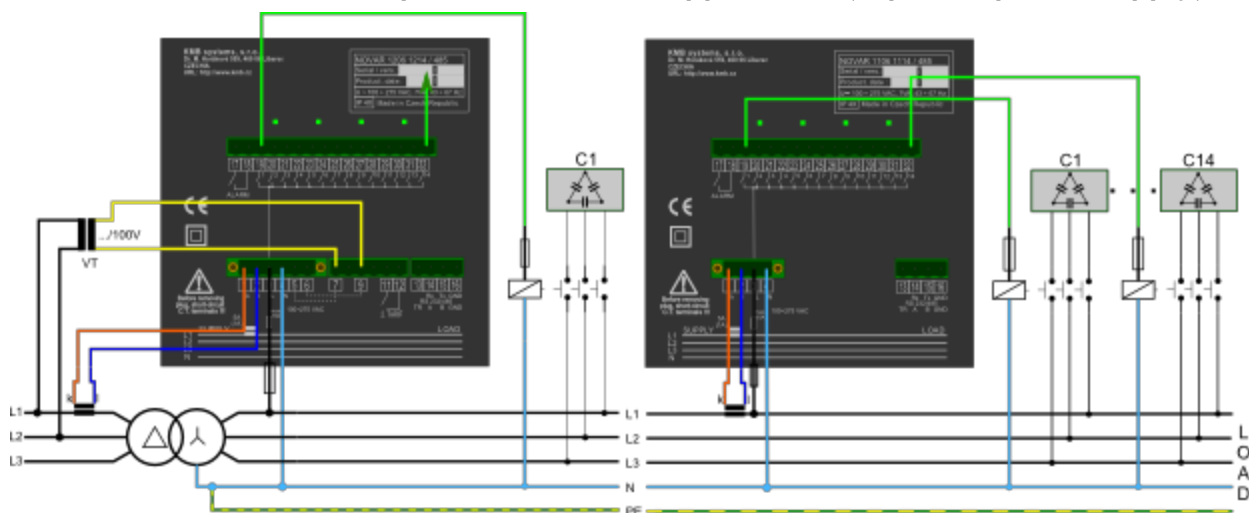


Fig. 2: NOVAR 1214 in a high voltage installation with VT and CT on the primary side (left) and tradition NOVAR 1114 in a low voltage grid (right). Separated auxiliary voltage for HV network or DC backup applications are currently supported with NOVAR 12xx, NOVAR 24xx and NOVAR 26xx.

Three phase power factor measurement and correction

Modern grids and appliances often present challenging tasks for reliable power factor control. Often the load in each phase is not well balanced. For such situation we have developed special, so called three phase controller.

Due to its extended number of compensation steps (up to 18), this controller is also useful for classical single phase applications with higher requirements on the variability of compensation. 18 single-phase controlled steps can provide more fluent and precise control, or additional steps for faster control interactions.

NOVAR 1414 - measures in 3 phases, controls three phase capacitors and reactors

Controller is designed for power correction applications with variable asymmetrical loads. It separately measures currents in all three phases and evaluates a more precise three-phase power factor.

NOVAR 2418, 2407, 2409 & 2416 - full three phase controller and digital analyzer

Represents a basic type of a complete three phase APFCR with advanced functions and parameters. It has compact enclosure and large bright segment LCD display. Also works as a basic panel meter for all common electrical quantities and a complete submeter.

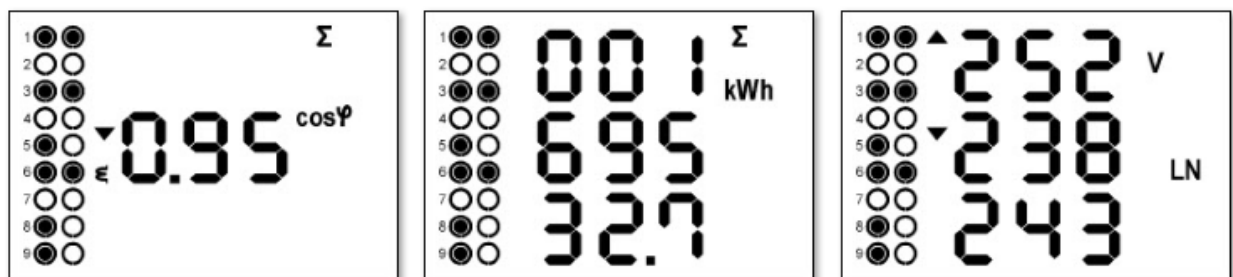


Fig. Sample screens of NOVAR 2418 with segment LCD display

NOVAR 2618, 2607, 2609 & 2616: Three phase PFC, power analyzer & data logger

A professional model of the innovated APFC line with advanced graphical display and various data logging options. It is based on an innovated hardware platform with improved, precise and continuous evaluation and control of a three phase system. It offers up to 18 relay outputs to control combinations of single-, two and three-phase compensation steps of both the compensation capacitors and decompensation reactors.

As an addition to the PFC function the instrument also includes a universal power analyser with 512MB of internal memory to monitor the performance of controlled compensation system. The built-in electricity meter registers both active and reactive energy in up to 3 different tariffs(TOU).

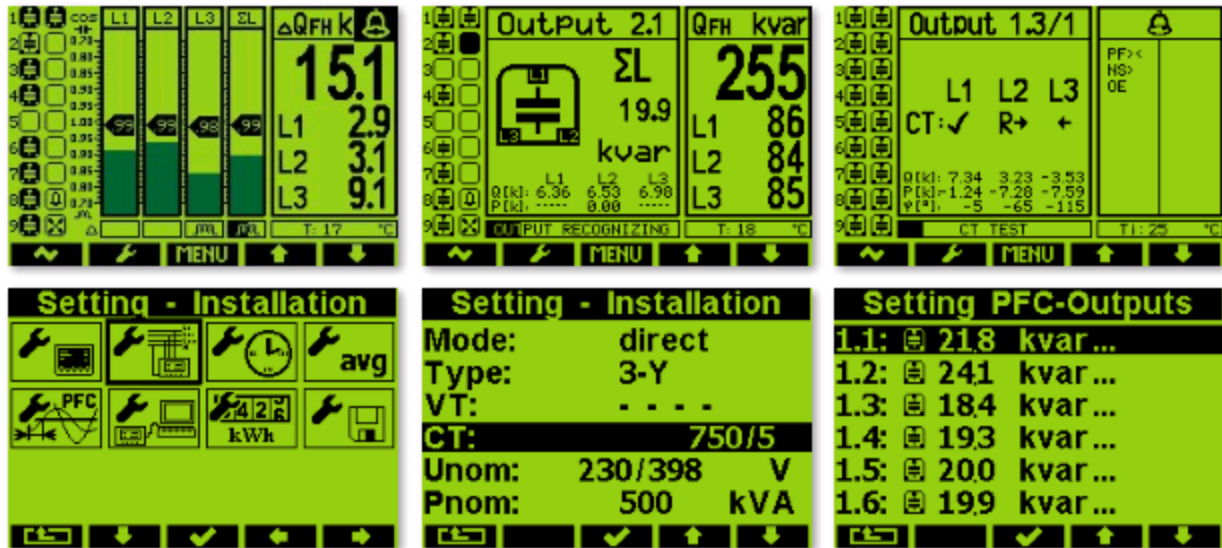


Fig. Sample screens - graphics of the NOVAR 2618 three phase power factor controller

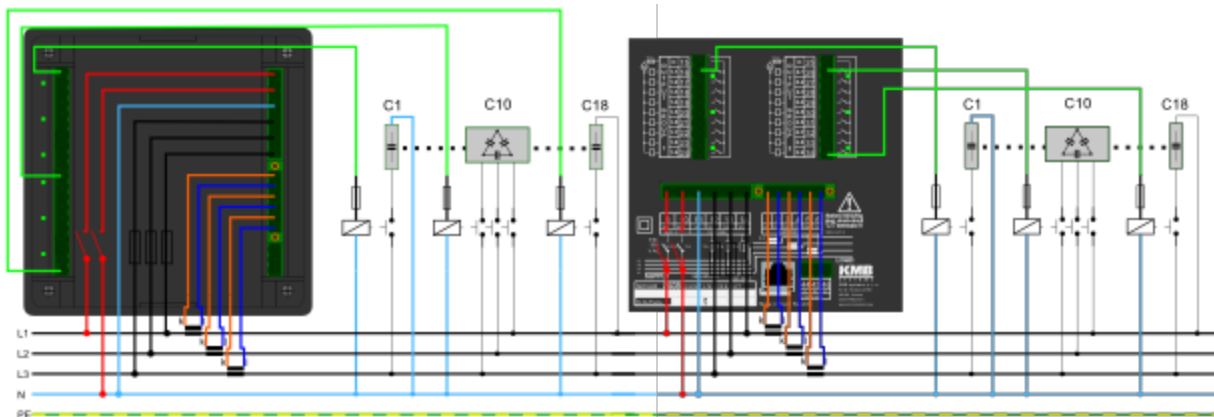


Fig. 3: typical connection of NOVAR 2418 (left) and NOVAR 2618 (right) in a three phase star connection in a low voltage network.

Real Time Power Factor Correction (dynamic compensation, RT-PFCR)

NOVAR 1312

These controllers are intended for fast control process. In the real time power factor correction it can achieve a maximum speed of up to 25 control reactions per second. It has 12 thyristor switching outputs and 2 relay outputs. It can also be used in so called mixed operation where part of the outputs can be configured for real time reaction and the rest for traditional low speed operation.

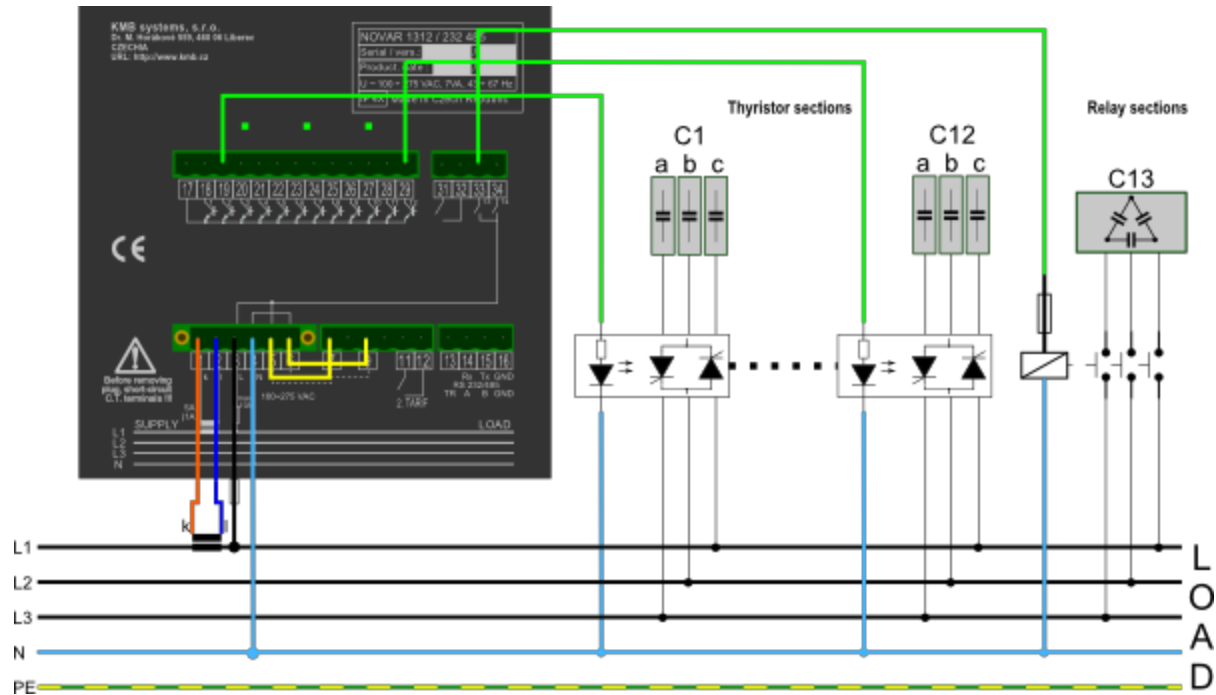


Fig. 4: Real time NOVAR 1312 automatic power factor controller in a special mixed mode application with up to 12 fast KATKA thyristor switch modules and 2 additional classical (slow mode) relay outputs. Mixed automatic mode is actually supported by all our controllers.

NOVAR 1312-3

A thyristor switching controller with three phase measurement for precise control of three-phase control blocks via KATKA solid state relay modules.

KATKA 20, KATKA 80

KATKA represents a product line of power factor correction modules for fast and clean, thyristor based, switching of the compensation steps. Different types are intended for various nominal sizes, with the passive or forced cooling and for various recommended wiring options.